

ABSTRACT

Keywords: High-resolution ^1H spectroscopy, *in vivo* NMR, magic angle turning, magic angle spinning, PHORMAT.

The present invention relates to a probe and processes useful for magnetic resonance imaging and spectroscopy instruments. More particularly, the invention relates to a MR probe and processes for obtaining resolution enhancements of fluid objects, including live specimens, using an ultra-slow (magic angle) spinning (MAS) of the specimen combined with a modified phase-corrected magic angle turning (PHORMAT) pulse sequence. Proton NMR spectra were measured of the torso and the top part of the belly of a female BALBc mouse in a 2T field, while spinning the animal at a speed of 1.5 Hz. Results show that even in this relatively low field with PHORMAT, an isotropic spectrum is obtained with line widths that are a factor 4.6 smaller than those obtained in a stationary mouse. Resolution of ^1H NMR metabolite spectra are thus significantly enhanced. Results indicate that PHORMAT has the potential to significantly increase the utility of ^1H NMR spectroscopy for *in vivo* biochemical, biomedical and/or medical applications involving large-sized biological objects such as mice, rats and even humans within a hospital setting. For small-sized objects, including biological objects, such as excised tissues, organs, live bacterial cells, and biofilms, use of PASS at a spinning rate of 30 Hz and above is preferred.